

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Dubautia imbricata* ssp. *imbricata*

COMMON NAME: Na`ena`e

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: August 2005

**STATUS/ACTION:**

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

**FOR PETITIONED CANDIDATE SPECIES:**

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): 1990

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

- \_\_\_ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- \_\_\_ F – Range is no longer a U.S. territory.
- \_\_\_ I – Insufficient information exists on biological vulnerability and threats to support listing.
- \_\_\_ M – Taxon mistakenly included in past notice of review.
- \_\_\_ N – Taxon does not meet the Act’s definition of “species.”
- \_\_\_ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Asteraceae (Sunflower family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

LAND OWNERSHIP: This subspecies occurs only on privately owned land.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul\_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa\_russell@fws.gov

#### BIOLOGICAL INFORMATION:

Species Description *Dubautia imbricata* ssp. *imbricata* is a shrub up to 2.5 meters (m) (8 feet (ft)) tall, forming dense clumps up to 2 m (6.6 ft) across, with glabrous stems. Leaves are opposite, oblong-lanceolate, 6 to 15 centimeters (cm) (2.4 to 6 inches (in)) long, and 0.8 to 2.5 cm (0.3 to 1.0 in) wide. Flower heads are usually 10 to 35 in cymosely clustered, paniculate, nearly glabrous inflorescences, 4 to 10 cm (1.6 to 4 in) long, 2 to 9 cm (0.8 to 3.5 in) wide, and with false bracts 7 to 9 mm (2.8 to 3.5 in) long. Corollas are yellow and finely glandular on the tube. Achenes are 2 to 3.5 mm (0.08 to 0.1 in) long with coarse hairs (Carr 1999).

Taxonomy *Dubautia imbricata* ssp. *imbricata* was described by St. John and G. Carr. This subspecies is recognized as a distinct taxon in Wagner *et al.* (1999a) and Wagner and Herbst (2003) the most recently accepted Hawaiian plant taxonomy.

Habitat Typical habitat is wet forest and bogs at elevations between 750 and 1,550 m (2,461 and 5,085 ft) (Wagner *et al.* 1999a; Hawaii Natural Heritage Program 2004).

Historical and Current Range/Current Status This subspecies is known from three populations totaling 1,000 or more individuals in the Wahiawa mountains on the island of Kauai (Steve

Perlman, National Tropical Botanical Garden, pers. comm. 1996; Ken Wood, National Tropical Botanical Garden, pers. comm. 2005).

#### THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

This subspecies is threatened by feral pigs (*Sus scrofa*) that adversely modify habitat (S. Perlman and K. Wood, pers. comms. 1996; K. Wood, pers. comm. 2005). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitats on Kauai. The pig is originally native to Europe, northern Africa, Asia Minor, and Asia. European pigs, introduced to Hawaii by Captain James Cook in 1778, became feral and invaded forested areas, especially wet and mesic forests and dry areas at high elevations. They are currently present on Kauai and four other islands, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Pigs are a major vector in the spread of many introduced plant species (Smith 1985; Stone 1985; Medeiros *et al.* 1986; Scott *et al.* 1986; Tomich 1986; Cuddihy and Stone 1990; Wagner *et al.* 1999a). No known conservation measures have been implemented to date to address this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

None known.

C. Disease or predation.

None known.

D. The inadequacy of existing regulatory mechanisms.

Pigs are managed in Hawaii as game animals but may populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers (Hawaii Heritage Program 1990). Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c). However, public hunting does not adequately control the number of pigs to eliminate this threat to *Dubautia imbricata* ssp. *imbricata*. No known conservation measures have been implemented to date to address this threat.

E. Other natural or manmade factors affecting its continued existence.

Numerous weed species threaten *Dubautia imbricata* ssp. *imbricata* (K. Wood, pers. comm. 2005).

The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985;

Wagner *et al.* 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al.* 1998) indicate nonnative plant species may outcompete native plants similar to *Dubautia imbricata* ssp. *imbricata*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al.* 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al.* 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to habitat of *Dubautia imbricata* ssp. *imbricata*, the Service believes nonnative plant species are a threat to *Cyanea lanceolata*. The remaining unmanaged populations of *Dubautia imbricata* ssp. *imbricata* are still impacted by this threat.

Nonnative plants are being controlled in a portion of this species range, but will probably never be completely eradicated because new propagules are constantly being dispersed into the fenced area from surrounding, unmanaged lands. Many widespread alien taxa cannot be completely eradicated from an island or the State, and therefore are expected to disperse into previously managed areas (Loope 1998, Smith 1985). The remaining populations of the species are still impacted by this threat.

#### CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Service has provided funding to The Nature Conservancy of Hawaii for fencing and weed control of Wahiawa Bog, which will benefit this species once implemented (The Nature Conservancy of Hawaii 2005). The Youth Conservation Corps has conducted some control of nonnative plant species in the area in the past several years (Marie Bruegmann, U.S. Fish and Wildlife Service, pers. comm. 2005).

#### SUMMARY OF THREATS:

The major threats to this taxon are pigs and nonnative plant species, which are believed to be a major cause of the decline of this species throughout its range. Feral pigs have not yet been fenced out of one known population of *Dubautia imbricata* ssp. *imbricata*. Nonnative plants have been reduced in a portion of the species' range. The species as a whole is still impacted by these threats and will require long-term monitoring and management to maintain threat free areas.

#### LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	<b>Imminent</b>	Monotypic genus	1
		Species	2
		<b>Subspecies/population</b>	<b>3*</b>

Moderate to Low	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

**Rationale for listing priority number:**

*Magnitude:*

This subspecies is highly threatened by pigs that degrade and destroy habitat, and by nonnative plants that outcompete and displace it. Threats to montane wet forest and bog habitat of *Dubautia imbricata* ssp. *imbricata* and to individuals of this species occur throughout its range, and are expected to continue or increase without their control or eradication. Feral pigs have not yet been fenced out of the one known population of *Dubautia imbricata* ssp. *imbricata*. Nonnative plants have been reduced in a portion of the species' range. The species as a whole is still impacted by these threats and will require long-term monitoring and management to maintain threat free areas.

*Imminence:*

Threats to *Dubautia imbricata* ssp. *imbricata* from pigs and nonnative plants are imminent because they are ongoing.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The subspecies does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, individuals of this subspecies will benefit from The Nature Conservancy's proposed fencing and weed control in the Wahiawa Bog area. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this subspecies' extinction, then the emergency rule process for this subspecies will be initiated. We will continue to monitor the status of *Dubautia imbricata* ssp. *imbricata* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

**DESCRIPTION OF MONITORING:**

Much of the information in this form is based on the results of two meetings of 20 botanical experts held by the Center for Plant Conservation in December 1995 and November 1996, and was updated by personal communication with Steve Perlman of National Tropical Botanical Garden in 1996 and Ken Wood of the National Tropical Botanical Garden in 1996. We have

incorporated additional information on this subspecies from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. No new information was provided by these individuals and they were not able to clarify the current status of these plants in 2004. In 2005 we contacted the species experts listed below and confirmation of the status of *Dubautia imbricate* ssp. *imbricata* was provided by Ken Wood, National Tropical Botanical Garden.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this subspecies is recognized as Rare (could be considered at risk) by Wagner *et al.* (1999b).

A species expert has provided new information confirming the status of the species this year and the results are included in this assessment.

#### COORDINATION WITH STATES:

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

#### LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	March 29, 2005	National Tropical Botanical Garden
9. Ken Wood *	August 2, 2005	National Tropical Botanical Garden
10. Marie Brueggmann*	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

\*Provided new information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004

Other resources utilized:

- Carr, G.D. 1999. *Dubautia*: In Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 97: 292-308.
- Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.
- Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.
- Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai'i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.
- Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.
- Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.
- Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.
- Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.
- Loope, L.L. 1998. Hawaii and Pacific Islands. Pp. 747-774. In: M.J. Mac, P.A. Opler, C.E. Puckett Haecker, and P.D. Doran (eds.). Status and Trends of the Nation's Biological Resources, Volume 2. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.
- Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.
- Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvenscens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap.48: 23-36.
- Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.
- Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept. 59:1-230.
- Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvenscens* D.C. (Melastomataceae). Journal of Biogeography 23: 775-781.

- Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. *Endangered Species Bulletin*. November/December.
- Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. *Studies in Avian Biology* 9: 1-429. Cooper Ornithological Society, Los Angeles.
- Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai'i. *Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park*, pp. 274-288.
- Smith, C.W. 1985. Impact of alien plants on Hawai'i's native biota: *in* Stone, C.P., and J.M. Scott (eds.), *Hawai'i's Terrestrial Ecosystems: Preservation and Management*. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.
- The Nature Conservancy. 2005. Kanaele Bog fence project. Proposal for extension of grant with U.S. Fish and Wildlife Service, Honolulu. June 1, 2005.
- Tomich, P.Q. 1986. Mammals in Hawai'i: A synopsis and notational bibliography. Bishop Museum Press, Honolulu. 375 pp.
- Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnaneck, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. *New Zealand Journal of Ecology* 21(1): 1-16.
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a. *Manual of the Flowering Plants of Hawai'i*, Bishop Mus. Spec. Publ. 97: 1-1918. University of Hawaii Press and Bishop Museum Press, Honolulu.
- Wagner, W.L., M.M. Bruegmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Mus. Occas. Pap. 60: 1-58.
- Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai'i, version 3.1. December 12, 2003. Available from the Internet. URL: <http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm>.
- Wenkam, R. 1969. *Kauai and the Park Country of Hawaii*. Sierra Club, San Francisco. 160 pp.
- Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.



APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: **Acting** David W. Winkler 11/10/05  
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: \_\_\_\_\_ August 23, 2006  
Director, Fish and Wildlife Service Date

Do not concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005  
Conducted by: Marie M. Brueggmann, Pacific Islands FWO  
Plant Recovery Coordinator

Comments:  
PIFWO Review

Reviewed by: Christa Russell Date: September 21, 2005  
Plant Conservation Program Leader

Gina Shultz Date: October 13, 2005  
Assistant Field Supervisor,  
Endangered Species

Patrick Leonard Date: October 13, 2005  
Field Supervisor